

**{Exhibit 50}**

**UK Patent Application GB 2,125,946, published  
March 14, 1984**

**BEST AVAILABLE COPY**

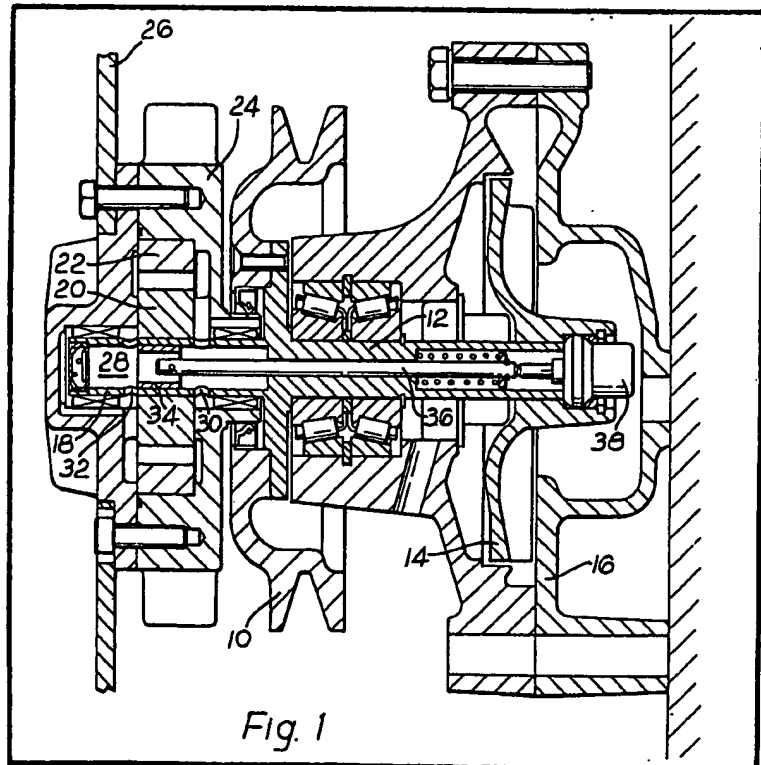
(12) UK Patent Application (19) GB (11) 2 125 946 A

- (21) Application No 8224077  
(22) Date of filing 20 Aug 1982  
(43) Application published  
14 Mar 1984  
(51) INT CL<sup>3</sup>  
F16D 31/04  
(52) Domestic classification  
F2W 022 188 176 194  
196 198 214 266 419 C2  
U1S 1968 2006 F2W  
(56) Documents cited  
GB 1281024  
GB 1255217  
(58) Field of search  
F2W  
(71) Applicant  
Concentric Pumps  
Limited,  
(United Kingdom),  
Gravelly Park,  
Tyburn Road,  
Erdington,  
Birmingham,  
B24 8HW  
(72) Inventor  
Robin Edward Child  
(74) Agent and/or address for  
service  
George Fuery & Co.,  
Whitehall Chambers,  
23 Colmore Row,  
Birmingham,  
B3 2BL

(54) Controlling a gerotor pump  
serving as a transmission coupling

(57) A drive transmission coupling  
between drive and driven members  
(12, 24) is in the form of a gerotor  
pump (20, 22) with a valve (34) in the  
pumped circuit which can be closed in  
order to prevent oil circulation and  
thereby lock the gerotor parts together  
for solid drive. The system is uni-

directional, and to safeguard the pump  
against damage in the event of  
reverse rotation, a safety one-way  
valve is provided in the circuit, instead  
of providing a reversing ring for the  
pump, so that oil recirculation can  
take place when the valve (34) is  
closed. As shown, the coupling drives  
an engine-cooling fan having blades  
(26) and the one-way valve is located  
in the mouth of a bore (28).



GB 2 125 946 A

## SPECIFICATION

## Transmission coupling

This invention relates to a transmission coupling of the kind comprising a gerotor pump arranged to circulate fluid via a control valve and with the pump rotors connected respectively to drive and driven members. When the control valve is closed, so that no fluid flow is possible, the pump acts as a substantially direct drive coupling between the parts, and when the valve is open there is slippage between the drive and driven members. The energy absorption can be minimised by arranging for the pump to self-prime.

A transmission coupling of the kind referred to may be used for the fan drive for an internal combustion engine. Such a drive is essentially unidirectional (because the internal combustion engine is itself unidirectional). However, there is always the possibility that the pump may be turned in the wrong direction, for example by a mechanic fitting a new fan belt, and since this could damage the gerotor pump, it would be conventional to use a reversible type pump in which the annulus is housed in an eccentric which can be turned with the annulus between limit positions and effectively this reverses the inlet and outlet ports and avoids the problem.

The object of the present invention is to provide an alternative and cheaper solution to the problem.

In accordance with the invention, a transmission coupling of the kind referred to is characterised by the provision of a one way valve in the fluid circuit.

One presently preferred embodiment of the invention is now more particularly described with reference to the accompanying drawings wherein:—

Figure 1 is a sectional elevation of a transmission coupling and

Figure 2 is an enlarged fragmentary view of part thereof.

As seen in the drawings, drive pulley 10 is fast with shaft 12 carrying the water pump impeller 14 in the water pump body 16. Said shaft 12 has an oppositely directed extension 18 carrying the inner rotor 20 of a gerotor pump of the N and N+1 type. The outer rotor or annulus 22 of the same is rotatable within the hub 24 carrying fan blades 26 and is disposed with its axis offset relative to the inner rotor, i.e. as in conventional gerotor pumps. The pump circulates working fluid from the inlet port to the outlet port via the interior 28 of the shaft extension 18 through radial ports 30 and 32 in the same.

The said extension 18 houses a sliding valve 34 carried by shaft 36 coupled to a thermostat 38. In the illustrated position the pump is operational and slippage occurs. When the

thermostat operates on an increased temperature, the valve 34 moves to the left in the drawing and closes off the ports 32 to interrupt the pumping circuit, and the inner and outer rotors are then effectively locked to give one-to-one drive to the fan blades from the shaft by virtue of the non-circulation of oil and the offset relation of the axes of the shaft 12 and the outer annulus 22.

The one-way valve is best seen in Figure 2 and is located in the end of the part 18. Essentially it consists of an aperture 40 which is normally closed by a disc 42 held in place by a spring 44. In the preferred embodiment the aperture 40 is provided in a pressing having bent over claws which forms the abutment for the springs.

In normal use, with the fan unit assembled correctly the valve disc 42 remains closed irrespective of the position of valve 34. If however, the fan unit is assembled the wrong way round it will be seen that, when the valve 34 is closed, the fan unit will tend to turn in the wrong direction with possible damage to the gerotor pump. The one-way valve eliminates this risk since in such circumstances, the fluid can circulate in the reverse direction, even though the valve 34 is closed, because the disc 42 can be unseated by such reverse flow. Thus, in these circumstances, the recirculatory path is completed by opening of the valve disc 42 to allow the fluid to flow from interior 28 through passageway 46 and back into the working spaces between the lobes of the inner and outer rotors. In this manner, hydraulic locking of the pump set is prevented in circumstances where the fan unit is incorrectly assembled.

The one-way valve may be formed by other types of valve member, e.g. a ball valve or flap valve, preferably with spring-loading.

## Claims

1. A transmission coupling of the kind comprising a gerotor pump arranged to circulate fluid via a control valve and with the pump rotors connected respectively to drive and driven members, characterised by the provision of a one-way valve in the fluid circuit.

2. A transmission coupling of the kind comprising a gerotor pump arranged to circulate fluid via a control valve, the pump rotors being connected respectively to drive and driven members in such a way that drive is transmitted via the gerotor pump when the control valve is closed to prevent recirculation of the fluid in one direction, characterised by the provision of a one-way valve which, when said control valve is closed, can open to allow fluid recirculation in the opposite direction when conditions prevail which tend to produce such reverse recirculation.

3. A transmission coupling substantially as described with reference to the accompanying drawings.

2125946

1/2

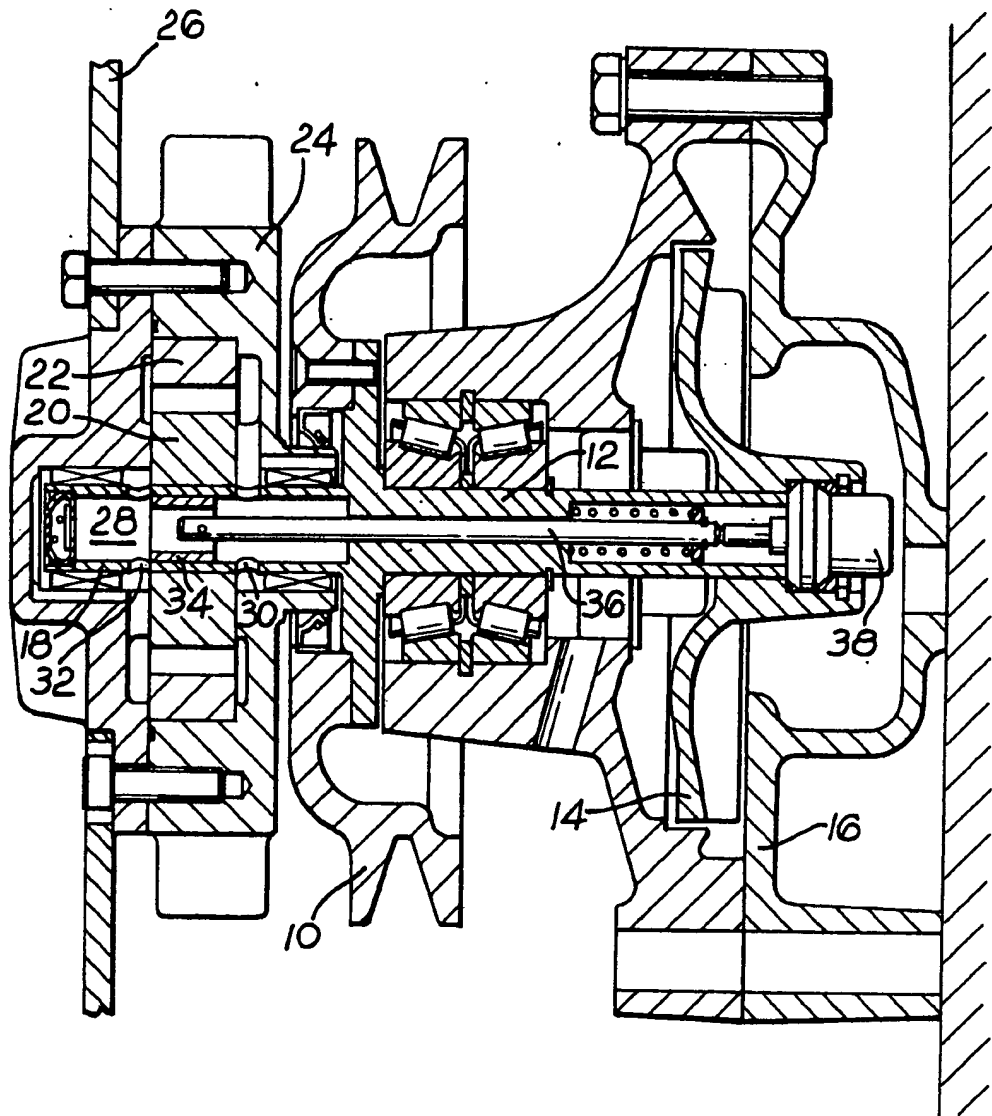


Fig. 1

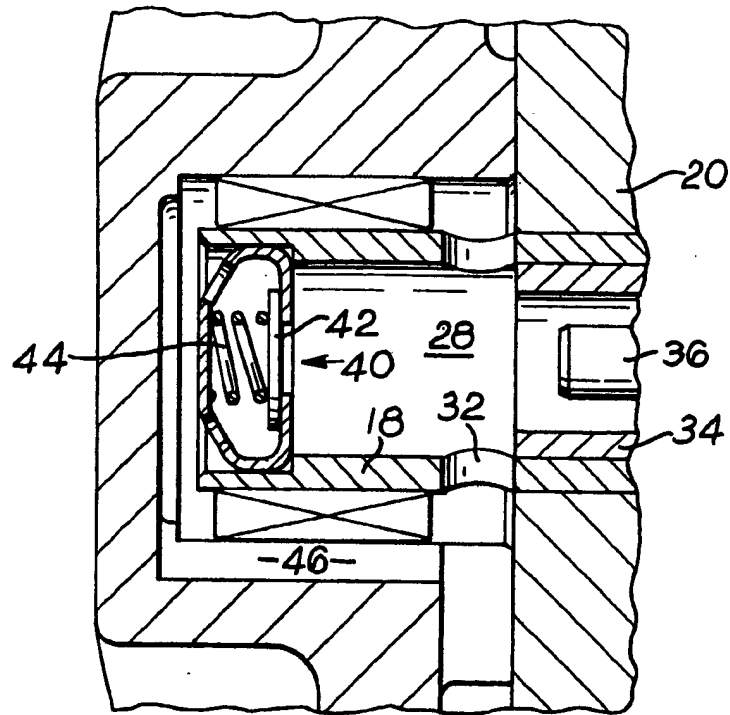


Fig. 2